CLAIMS

1. *(PREVIOUSLY PRESENTED)* An apparatus including a circuit for converting an analog signal to a pulse-width-modulated signal, comprising:

an integration stage configured to receive, combine and integrate an analog input signal and a set of one or more feedback signals and in accordance therewith provide a set of one or more integrated signals;

a modulation stage, coupled to said integration stage, configured to receive and modulate a final portion of said set of one or more integrated signals and in accordance therewith provide a discrete time pulse width modulated signal; and

a first feedback stage, coupled between said modulation stage and said integration stage, configured to receive said discrete time pulse width modulated signal and in accordance therewith provide a first portion of said set of one or more feedback signals.

2. *(ORIGINAL)* The apparatus of claim 1, wherein:

said integration stage comprises an adder circuit configured to receive and add said analog input signal and said first portion of said set of one or more feedback signals and in accordance therewith provide a first combined signal; and

said integration stage is further configured to integrate said first combined signal and in accordance therewith provide said set of one or more integrated signals.

3. *(ORIGINAL)* The apparatus of claim 1, wherein:

said integration stage comprises an adder circuit configured to receive and add said analog input signal and said first portion of said set of one or more feedback signals and in accordance therewith provide a first combined signal;

said integration stage is further configured to integrate said first combined signal and in accordance therewith provide an initial portion of said set of one or more integrated signals; and

said integration stage further comprises a feed forward circuit configured to receive and feed forward said analog input signal and in accordance therewith provide a feed forward signal.

4. *(ORIGINAL)* The apparatus of claim 1, wherein said integration stage comprises at least one continuous-time integrator circuit.

5. *(ORIGINAL)* The apparatus of claim 1, wherein said integration stage comprises at least one sampled integrator circuit.

6. *(ORIGINAL)* The apparatus of claim 1, wherein said modulation stage comprises:

a quantization stage, coupled to said integration stage, configured to receive and quantize said final portion of said set of one or more integrated signals and in accordance therewith provide a quantized signal; and

a pulse width modulation stage, coupled to said quantization stage, configured to receive said quantized signal and in accordance therewith provide said discrete time pulse width modulated signal.

7. *(ORIGINAL)* The apparatus of claim 6, wherein said quantization stage comprises a multibit quantization circuit configured to convert said final portion of said set of one or more integrated signals to a digital signal having multiple bits as said quantized signal.

8. *(PREVIOUSLY PRESENTED)* The apparatus of claim 1, wherein said pulse width modulation stage comprises a discrete pulse width modulator circuit which includes:

an input stage configured to receive at least one digital input signal as said quantized signal; and

an output stage configured to provide said discrete time pulse width modulated signal corresponding to said at least one digital input signal.

9. *(ORIGINAL)* The apparatus of claim 1, wherein said first feedback stage comprises at least one continuous-time feedback circuit.

10. *(ORIGINAL)* The apparatus of claim 1, wherein said first feedback stage comprises at least one discrete time feedback circuit.

11. *(PREVIOUSLY PRESENTED)* The apparatus of claim 1, wherein said first feedback stage comprises an anti-aliasing stage configured to filter said discrete time pulse width modulated signal and in accordance therewith provide said first portion of said set of one or more feedback signals.

12. *(ORIGINAL)* The apparatus of claim 1, further comprising a second feedback stage, coupled between said quantization stage and said integration stage, configured to receive said quantized signal and in accordance therewith provide a second portion of said set of one or more feedback signals

13. *(ORIGINAL)* The apparatus of claim 12, wherein:

said integration stage comprises a first adder circuit configured to receive and add said analog input signal and said first portion of said set of one or more feedback signals and in accordance therewith provide a first combined signal;

said integration stage is further configured to integrate said first combined signal and in accordance therewith provide a portion of said set of one or more integrated signals;

said integration stage further comprises a second adder circuit configured to receive and add said portion of said set of one or more integrated signals and said second portion of said set of one or more feedback signals and in accordance therewith provide a second combined signal; and

said integration stage is still further configured to integrate said second combined signal and in accordance therewith provide another portion of said set of one or more integrated signals.

14. *(ORIGINAL)* The apparatus of claim 12, wherein said integration stage comprises at least one continuous-time integrator circuit and at least one sampled integrator circuit.

15. *(ORIGINAL)* The apparatus of claim 12, wherein said modulation stage comprises:

a quantization stage, coupled to said integration stage, configured to receive and quantize said final portion of said set of one or more integrated signals and in accordance therewith provide a quantized signal; and

a pulse width modulation stage, coupled to said quantization stage, configured to receive said quantized signal and in accordance therewith provide said discrete time pulse width modulated signal.

16. *(ORIGINAL)* The apparatus of claim 15, wherein said quantization stage comprises a multibit quantization circuit configured to convert said final portion of said set of one or more integrated signals to a digital signal having multiple bits as said quantized signal.

17. *(PREVIOUSLY PRESENTED)* The apparatus of claim 12, wherein said pulse width modulation stage comprises a discrete pulse width modulator circuit which includes:

an input stage configured to receive at least one digital input signal as said quantized signal; and

an output stage configured to provide said discrete time pulse width modulated signal corresponding to said at least one digital input signal.

18. *(ORIGINAL)* The apparatus of claim 12, wherein said first feedback stage comprises at least one continuous-time feedback circuit and said second feedback stage comprises at least one discrete time feedback circuit.

19. *(PREVIOUSLY PRESENTED)* The apparatus of claim 12, wherein:

said first feedback stage comprises an anti-aliasing stage configured to filter said discrete time pulse width modulated signal and in accordance therewith provide said first portion of said set of one or more feedback signals; and

said second feedback stage comprises a digital-to-analog conversion stage configured to receive and convert said quantization signal and in accordance therewith provide said second portion of said set of one or more feedback signals.

20. *(ORIGINAL)* An apparatus including a circuit for converting an analog signal to a pulse-width-modulated signal, comprising:

integration means for receiving, combining and integrating an analog input signal and a set of one or more feedback signals and in accordance therewith providing a set of one or more integrated signals;

modulation means for receiving and modulating a final portion of said set of one or more integrated signals and in accordance therewith providing a discrete time pulse width modulated signal; and

first feedback means for receiving said discrete time pulse width modulated signal and in accordance therewith providing a first portion of said set of one or more feedback signals.

21. *(ORIGINAL)* The apparatus of claim 20, wherein:

said integration means comprises adder means for receiving and adding said analog input signal and said first portion of said set of one or more feedback signals and in accordance therewith providing a first combined signal; and

said integration means is further for integrating said first combined signal and in accordance therewith providing said set of one or more integrated signals.

22. *(ORIGINAL)* The apparatus of claim 20, wherein:

said integration means comprises adder means for receiving and adding said analog input signal and said first portion of said set of one or more feedback signals and in accordance therewith providing a first combined signal;

said integration means is further for integrating said first combined signal and in accordance therewith providing an initial portion of said set of one or more integrated signals; and

said integration means further comprises feed forward means for receiving and feeding forward said analog input signal and in accordance therewith providing a feed forward signal.

23. *(ORIGINAL)* The apparatus of claim 20, wherein said integration means comprises at least one continuous-time integrator means for integrating said first combined signal in a continuous-time manner.

24. *(ORIGINAL)* The apparatus of claim 20, wherein said integration means comprises at least one sampled integrator means for integrating said first combined signal in a sampled manner.

25. *(ORIGINAL)* The apparatus of claim 20, wherein said modulation means comprises:

quantization means for receiving and quantizing said final portion of said set of one or more integrated signals and in accordance therewith providing a quantized signal; and

pulse width modulation means for receiving said quantized signal and in accordance therewith providing said discrete time pulse width modulated signal.

26. *(ORIGINAL)* The apparatus of claim 25, wherein said quantization means comprises multibit quantization means for converting said final portion of said set of one or more integrated signals to a digital signal having multiple bits as said quantized signal.

27. *(PREVIOUSLY PRESENTED)* The apparatus of claim 20, wherein said

pulse width modulation means comprises discrete pulse width modulator means including:

input means for receiving at least one digital input signal as said quantized signal; and

output means for providing said discrete time pulse width modulated signal corresponding to said at least one digital input signal.

28. *(PREVIOUSLY PRESENTED)* The apparatus of claim 20, wherein said first feedback means comprises at least one continuous-time feedback means for receiving said discrete time pulse width modulated signal and in accordance therewith providing said first portion of said set of one or more feedback signals in a continuous-time manner.

29. *(PREVIOUSLY PRESENTED)* The apparatus of claim 20, wherein said first feedback means comprises at least one discrete time feedback means for receiving said discrete time pulse width modulated signal and in accordance therewith providing said first portion of said set of one or more feedback signals in a digital manner.

30. *(PREVIOUSLY PRESENTED)* The apparatus of claim 20, wherein said first feedback means comprises anti-aliasing means for filtering said discrete time pulse width modulated signal and in accordance therewith providing said first portion of said set of one or more feedback signals.

31. *(ORIGINAL)* The apparatus of claim 20, further comprising second feedback means for receiving said quantized signal and in accordance therewith providing a second portion of said set of one or more feedback signals.

32. *(ORIGINAL)* The apparatus of claim 31, wherein:

said integration means comprises first adder means for receiving and adding said analog input signal and said first portion of said set of one or more feedback signals and in accordance therewith providing a first combined signal;

said integration means is further for integrating said first combined signal and in accordance therewith providing a portion of said set of one or more integrated signals;

said integration means further comprises second adder means for receiving and adding said portion of said set of one or more integrated signals and said second portion of said set of one or more feedback signals and in accordance therewith providing a second combined signal; and

said integration means is still further for integrating said second combined signal and in accordance therewith providing another portion of said set of one or more integrated signals.

33. *(ORIGINAL)* The apparatus of claim 31, wherein said integration means comprises at least one continuous-time integrator means and at least one sampled integrator means for receiving, combining and integrating said analog input signal and said set of one or more feedback signals and in accordance therewith providing said set of one or more integrated signals.

34. *(ORIGINAL)* The apparatus of claim 31, wherein said modulation means comprises:

quantization means for receiving and quantizing said final portion of said set of one or more integrated signals and in accordance therewith providing a quantized

signal; and

pulse width modulation means for receiving said quantized signal and in accordance therewith providing said discrete time pulse width modulated signal.

35. *(ORIGINAL)* The apparatus of claim 34, wherein said quantization means comprises multibit quantization means for converting said final portion of said set of one or more integrated signals to a digital signal having multiple bits as said quantized signal.

36. *(PREVIOUSLY PRESENTED)* The apparatus of claim 31, wherein said pulse width modulation means comprises discrete pulse width modulator means including:

input means for receiving at least one digital input signal as said quantized signal; and

output means for providing said discrete time pulse width modulated signal corresponding to said at least one digital input signal.

37. *(PREVIOUSLY PRESENTED)* The apparatus of claim 31, wherein:

said first feedback means comprises at least one continuous-time feedback means for receiving said discrete time pulse width modulated signal and in accordance therewith providing said first portion of said set of one or more feedback signals in a continuous-time manner; and

said second feedback means comprises at least one discrete time feedback means for receiving said discrete time pulse width modulated signal and in accordance therewith providing said first portion of said set of one or more feedback signals in a digital manner.

38. *(PREVIOUSLY PRESENTED)* The apparatus of claim 31, wherein:

said first feedback means comprises anti-aliasing means for filtering said discrete time pulse width modulated signal and in accordance therewith providing said first portion of said set of one or more feedback signals; and

said second feedback means comprises digital-to-analog conversion means for receiving and converting said quantization signal and in accordance therewith providing said second portion of said set of one or more feedback signals.

39. *(ORIGINAL)* A method for converting an analog signal to a pulse-width-modulated signal, comprising the steps of:

receiving, combining and integrating an analog input signal and a set of one or more feedback signals and in accordance therewith generating a set of one or more integrated signals;

generating a discrete time pulse width modulated signal in accordance with said set of one or more integrated signals; and

feeding back said discrete time pulse width modulated signal as a first portion of said set of one or more feedback signals.

40. *(ORIGINAL)* The method of claim 39, wherein said receiving, combining and integrating step comprises:

receiving and adding said analog input signal and said first portion of said set of one or more feedback signals and in accordance therewith generating a first combined signal; and

integrating said first combined signal and in accordance therewith generating said set of one or more integrated signals.

41. *(ORIGINAL)* The method of claim 39, wherein said receiving, combining and integrating step comprises:

receiving and adding said analog input signal and said first portion of said set of one or more feedback signals and in accordance therewith generating a first combined signal;

integrating said first combined signal and in accordance therewith generating an initial portion of said set of one or more integrated signals; and

feeding forward said analog input signal and in accordance therewith generating a feed forward signal.

42. *(ORIGINAL)* The method of claim 39, wherein said receiving, combining and integrating step comprises generating said set of one or more integrated signals in a continuous-time manner.

43. *(ORIGINAL)* The method of claim 39, wherein said receiving, combining and integrating step comprises generating said set of one or more integrated signals in a sampled manner.

44. *(ORIGINAL)* The method of claim 39, wherein said generating step comprises:

quantizing a final portion of said set of one or more integrated signals and in accordance therewith generating a quantized signal; and

generating said discrete time pulse width modulated signal in accordance with said quantized signal.

45. *(ORIGINAL)* The method of claim 44, wherein said quantizing step

comprises converting said final portion of said set of one or more integrated signals to a digital signal having multiple bits as said quantized signal.

46. *(PREVIOUSLY PRESENTED)* The method of claim 39, wherein said generating step comprises:

receiving at least one digital input signal as said quantized signal; and

generating said discrete time pulse width modulated signal in accordance with said at least one digital input signal.

47. *(PREVIOUSLY PRESENTED)* The method of claim 39, wherein said step of feeding back said discrete time pulse width modulated signal as a first portion of said set of one or more feedback signals comprises feeding back said discrete time pulse width modulated signal as said first portion of said set of one or more feedback signals in a continuous-time manner.

48. *(PREVIOUSLY PRESENTED)* The method of claim 39, wherein said step of feeding back said discrete time pulse width modulated signal as a first portion of said set of one or more feedback signals comprises feeding back said discrete time pulse width modulated signal as said first portion of said set of one or more feedback signals in a digital manner.

49. *(PREVIOUSLY PRESENTED)* The method of claim 39, wherein said step of feeding back said discrete time pulse width modulated signal as a first portion of said set of one or more feedback signals comprises filtering said discrete time pulse width modulated signal.

50. *(ORIGINAL)* The method of claim 39, further comprising the step of feeding back said quantized signal as a second portion of said set of one or more feedback signals.

51. *(ORIGINAL)* The method of claim 50, wherein said receiving, combining and integrating step comprises:

adding said analog input signal and said first portion of said set of one or more feedback signals and in accordance therewith generating a first combined signal;

integrating said first combined signal and in accordance therewith providing a portion of said set of one or more integrated signals;

adding said portion of said set of one or more integrated signals and said second portion of said set of one or more feedback signals and in accordance therewith generating a second combined signal; and

integrating said second combined signal and in accordance therewith generating another portion of said set of one or more integrated signals.

52. *(ORIGINAL)* The method of claim 50, wherein said receiving, combining and integrating step comprises receiving, combining and integrating said analog input signal and said set of one or more feedback signals and in accordance therewith generating at least one continuous-time integrated signal and at least one sampled integrated signal as said set of one or more integrated signals.

53. *(ORIGINAL)* The method of claim 50, wherein said generating step comprises:

quantizing a final portion of said set of one or more integrated signals and in accordance therewith generating a quantized signal; and

generating said discrete time pulse width modulated signal in accordance with said quantized signal.

54. *(ORIGINAL)* The method of claim 53, wherein said quantizing step comprises converting said final portion of said set of one or more integrated signals to a digital signal having multiple bits as said quantized signal.

55. *(PREVIOUSLY PRESENTED)* The method of claim 50, wherein said generating step comprises:

receiving at least one digital input signal as said quantized signal; and

generating said discrete time pulse width modulated signal in accordance with said at least one digital input signal.

56. *(PREVIOUSLY PRESENTED)* The method of claim 50, wherein:

said step of feeding back said discrete time pulse width modulated signal as a first portion of said set of one or more feedback signals comprises receiving said discrete time pulse width modulated signal and in accordance therewith generating said first portion of said set of one or more feedback signals in a continuous-time manner; and

said step of feeding back said quantized signal as a second portion of said set of one or more feedback signals comprises receiving said discrete time pulse width modulated signal and in accordance therewith generating said first portion of said set of one or more feedback signals in a digital manner.

57. *(PREVIOUSLY PRESENTED)* The method of claim 50, wherein:

said step of feeding back said discrete time pulse width modulated signal as a

first portion of said set of one or more feedback signals comprises filtering said discrete time pulse width modulated signal; and

said step of feeding back said quantized signal as a second portion of said set of one or more feedback signals comprises converting said quantization signal to an analog signal.